OPERATORS MANUAL
FOR
SPRIMAS MS MOB

MOBILE TEST EQUIPMENT FOR FIELD SPRAYERS

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- Functional faults, which apply to or from a PC-program or PC-equipment, not delivered by the seller,
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With regards

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1. INTRODUCTION

The mobile measuring and documenting system "Sprimas" is used for the following measurements:

- The sprayer boom spray pattern
- The average amount per nozzle
- The total amount for the boom

The measurement carriage moves one metre at a time along the test rail under the sprayer boom and measures the amount of liquid that hits the measuring plate and runs into the measuring containers. The amount of liquid in the measuring containers is measured by ultra sound.

The measuring containers are emptied automatically with solenoid valves when the test is finished.

When the test is finished the carriage automatically returns to the start position. A cable is used to transfer the data to a PC.

Properties:

- Fast and simple setup and breakdown of the system.
- Low transport volume due to compact construction with removable measuring plate.
- Very simple operation.
- Continual flow metering for automatic adjustment of the measuring time for the nozzle size - minimum test time.
- High accuracy due to ultra sound measuring.
- Accurate carriage positioning due to the metering wheel.
- Safe data transfer from the carriage to the PC.
- Easy to use and functional software for test data documentation.

2. SETTING THE TEST SYSTEM UP

IMPORTANT!

As the test results can be affected by, i.e. frost or wind we recommend testing the system indoors.

NOTE!

As the measuring plate has sharp edges to fulfil its purpose personal injury might incur. Work gloves should be worn when handling the plate.

2.1 SETTING THE RAILS UP

Join each individual rail section and position horizontally where the test is to be carried out. The test rail length must be *at least* the boom width + ½ metre. All nozzles must be in the test rail length. For safety reasons and to ensure that the carriage does run off the test rails a stop is fitted at each end of the test rail.

The carriage will stop and run back and switch off if the carriage runs to one of the stops or meets another obstruction.

2.2 SETTING THE CARRIAGE UP

Seen from the tractor the carriage is positioned at the start of the test rail to the right so both switches can be seen. Place the test plate on the carriage. The chains on the plate should be facing the tractor. Fix the plate in place with the snap locks.

2.3 DRIP CHAINS

The chains on the plate are used to settle the liquid flow and must not be removed.

Lay each of the four chain sections in the middle of the profile next to each other. The ends of the chains should hang into the measuring container's funnel.

2.4 SETTING THE PC UP

The PC should be placed in the dry away from the spray area (all connections for the printer, screen, etc can be seen in the PC manual). The included 25-pin connector is connected to either COM1 or COM2 on the PC depending on the configuration of the PC. Lay the round plug next to the carriages start position.

NOTE! The plug must not get wet.

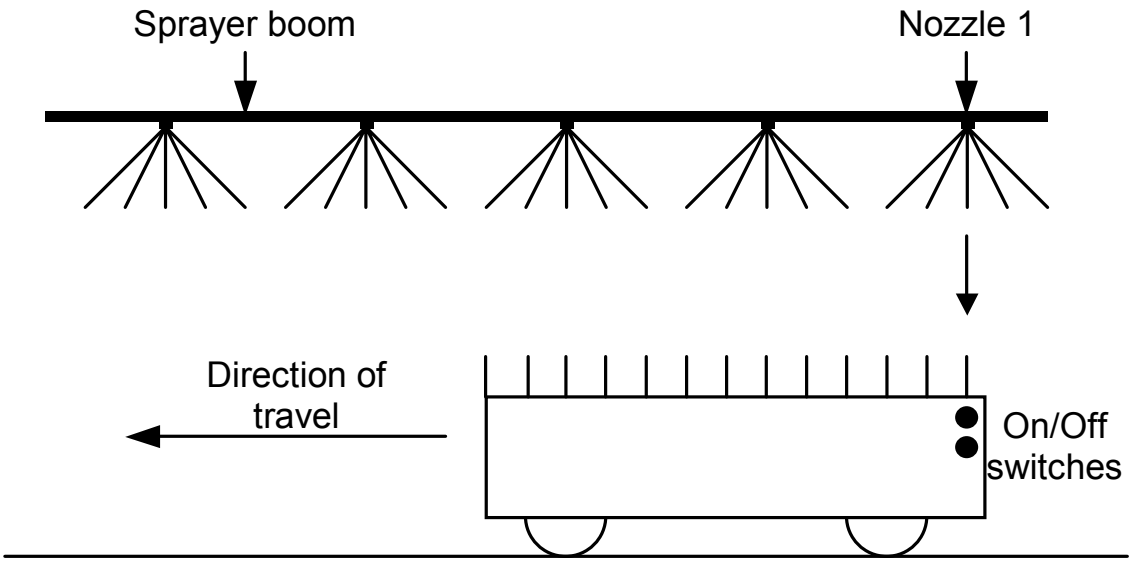
Switch the computer on and start the program with "messen" (the test procedure is started.

3 THE TEST PROCEDURE

Note!

When conducting a test the sprayer may be contaminated with chemicals. For health and safety reasons chemical resistant gloves should be worn at all times.

3.1 POSITIONING THE TEST CARRIAGE



3.1.1 THE BOOM POSITION IN RELATION TO THE CARRIAGE

The sprayer boom must be parallel over the rail. Ensure that the carriage has enough room to move along the whole length of the rail. The spray direction should be adjusted to ensure that the spray hits the measuring plate at a right angle. The sprayed liquid must hit the plate behind the drip chains to ensure accurate measurement. The height from the lower end of the nozzle to the channel separators should be the same as the recommended height for the nozzles being tested (normally 50 cm). The first nozzle (to the right when seen from the tractor) must be directly above the first channel separator on the measuring plate (above the start/stop switches as seen on the above diagram). The test results are displayed in the order the test has been carried out.

3.1.2 THE WATER RUNNING FROM THE PLATE

Ensure that the liquid running from the channels does not run past the drip chains. If this is the case then the chains and the plate must be cleaned.

3.1.3 SPRAY HEIGHT AND ANGLE

Under certain circumstances it might not be possible for the carriage to run under the sprayer frame and tank. If the hydraulic hoses from the tractor cannot reach ramps can be used. The angle between the spray direction and the plate must not be less than 90^{o} (see 3.1.1) as the liquid might accumulate on the measuring plate. The sprayer frame must be supported to avoid accidental damage to the measuring plate and carriage should the sprayer be lowered.

3.1.4 MANUAL POSITIONING OF THE CARRIAGE

NOTE!

Stay clear of the carriage ends (on the test rails) when manually operating the carriage to avoid accidents. The carriage can be driven under the nozzle for precise adjustments. This is done as follows:

The carriage must be switched off (no green light), press and hold the green button and the carriage will move slowly after 2 - 3 seconds. After a short while the carriage will run faster. The carriage can be stopped again by releasing the green button. The carriage will run in the other direction in the same manner as described above if the green button is pressed again.

3.2 SPRAYING

Important!

The sprayer must have been rinsed with clean water according to the rules for testing the sprayer. Before filling the sprayer with clean water it is important to check, visually that the inside of the sprayer has been cleaned and rinsed.

Small air bubbles, caused by certain cleaning agents, in the test liquid can disturb the test procedure (see 6.3). The sprayer must therefore be totally rinsed with clean water after cleaning.

Rinsing the sprayer with clean water is important as the person conducting the test is in danger of contamination by chemicals both on exposed skin and breathing in particles floating in the air.

3.2.1 START SPRAYING

Start the pump and adjust the sprayer pressure to the pressure to be used for testing, i.e. 2 bar.

3.2.2 CHECKING THE SPRAY PATTERN

Visually check the spray pattern. If there are any nozzles that are not spraying correctly, correct the problem to save time and water.

3.2.3 STARTING THE TEST PROCEDURE

If the carriage is switched off (green light off), switch the carriage on by pressing the green button (green light on).

The test procedure is started by pressing the green button, but should not be started until the measuring plate is wet and the cable connecting the carriage to the PC is disconnected. The green light will be brighter.

The carriage will automatically switch off if the test has not been started after 15 minutes, and if no data transfer to the PC has taken place.

Pressing the red button (emergency stop) will stop the carriage at any time.

3.2.4 THE TEST COURSE

Note!

Do not stand on the rails when operating the carriage to avoid personal injury.

The carriage will now move along the rail one metre at a time and stop for a suitable amount of time after each metre to measure the amount of liquid in the measuring containers.

The measuring and waiting time depends on the nozzle size (l/min.) and is automatically calculated by the system after the first measurement.

When no liquid is measured in the outside channel the test will stop and the carriage will return to the start position.

It is possible to determine the test length exactly before the test starts, e.g. a 12 metre working width is entered as 12 metres. This means that the spray area at the end of the boom, that does not fully overlap, will not be measured. For more information regarding this see 3.3.5.

The test is finished when the carriage returns or when the carriage is outside of the width being tested.

The test can be stopped at any time by switching the sprayer off, the carriage will return to the start position.

The test can also be stopped at any time by pressing the emergency stop (red) button. The test data will be lost. The carriage will return as described in 3.1.4.

If the carriage runs into one of the stops at the end of the rails or runs into an obstacle of any type the carriage will return to the start position, the test data can be interpreted.

The green light will flash should an error occur. If the carriage is connected to the PC the error will be displayed on the screen.

3.2.5 TRANSFERRING THE TEST RESULTS

Connect the carriage to the PC with the data transfer cable when the carriage has returned to the start position. The test data can be seen on the screen.

Note!

If the sprayer test is to be carried out in two parts (see 3.4) do not connect the carriage to the PC until both parts have finished.

3.3 PC PROGRAMME "SPRIMAS VERSION 2.0"

3.3.1 INSTALLATION AND SETUP OF THE PC PROGRAMME

The PC programme must be installed on the PC before the first test is carried out.

From a DOS-prompt and with the supplied disk in either disk drive "A" or "B" (if the wrong drive is selected type "A:" and press enter or "B:" and press enter). Type "install" and press enter, the install program will start. Up to three user data can be input, i.e. "Customer". A customer name can be entered when using the program, this name will appear on the test results. Select the serial port that the data transfer cable will be connected to. These settings can be altered during use of the programme by pressing the F8 key.

3.3.2 THE PC SCREEN

If the carriage is connected to the PC the date & time of the clock in the carriage will be displayed at the bottom of the PC screen. A finished test is automatically transferred to the PC, this can be seen on the screen.

3.3.3 ON SCREEN REFERENCES

A list of keys and their function, i.e. change a setting or perform an action, is shown on the main screen to the left. In the other screens a list of keys with their functions will be shown on the bottom of the screen.

3.3.4 ENCODING VIA THE KEYS

Pressing the key "Bild" will display a list of the sprayer settings. Check these settings (working width, spray angle & height) before the test results are calculated. These settings ensure that only the fully overlapped boom width is used for the calculations. The test results will be inaccurate if these settings are incorrect. These encodements can take place both before and after the test.

3.3.5 TRANSFERRING THE WORKING WIDTH

(Only possible when testing the boom as one section) The program item working width, which is only available when the carriage is connected to the PC ("Transfer working width to carriage") ensures that the carriage only tests the encoded working width. This saves time and water as only the fully overlapped working width is tested, so nozzles with a wide spray angle (i.e. >130^{o}) are only tested in the area that fully overlaps. The transferred width is automatically deleted in the carriage after 10 minutes. Using this function is optional.

3.3.6 MINMIUM REQUIREMENTS FOR THE PC

An IBM compatible PC with MS DOS 3.3 or higher. The PC must have a hard disk, a 3.5" floppy disc drive, a Parallel port for the printer, a serial port for the data transfer cable, minimum 640 kb memory plus a VGA graphics card.

The printer must be able to print graphics and the system (DOS version, printer and graphic card must allow for the "Print Screen" function to be used).

3.4 SPRAYER TEST IN 2 STEPS

It is possible to split the sprayer test into 2 steps if the test rails are smaller than the total width for the sprayer being tested.

The first test step is carried out as usual and the carriage is positioned so that the first nozzle (first nozzle to the right when seen from the tractor) is directly above the first channel separator. The left-hand boom can remain folded. Complete the visual test and complete the first test as normal (see 3.2.3 and 3.2.4) but do not connect the carriage to the PC.

When the second step of the test is to be carried out, the carriage must measure at least the last measured nozzle (from the first step of the test). Position the carriage (using the start/stop buttons) so that the first channel separator is under an already measured nozzle. Visually check all nozzles to save time and water and start the second part of the test. To ensure that the overlap for the middle nozzles is correctly tested then at least one nozzle from the first part of the test must be to the right of the carriage start position for the second test.

The total boom width must be encoded into the PC when transferring test data to the PC. The PC programme will automatically calculate the test result using both parts of the test, which are stored in the carriage. To put both parts of the test together the PC programme will ask what the nozzle number was when the second part of the test was started (see the text in the upper part of the screen). Nozzle number 1 is the first nozzle to the right when seen from the tractor.

4 TRANSPORT

Always place and fasten the carriage to the short test rail for transport. When placing on the rail ensure that there is enough room for the pulse wheel. Inaccurate test results will be given if the pulse wheel or sensor are damaged.

The carriage must always be transported horizontally as the carriage is fitted with a car battery (containing acid). The measuring plate must be handled and packed with care to avoid damage to the edges (a bend of 1 mm = an inaccuracy of 1%).

5 MAINTENANCE

5.1 SOLENOID VALVES

The valves in the measuring containers should be open during pauses in the test procedure. This is not the case if the test is stopped with the red button. The valves will, however, open automatically after 15 minutes. The valves must be rinsed with clean water when open before longer pauses.

5.2 BATTERY

The present voltage of the carriage battery is displayed on the right-hand side of the screen each time data is transferred from the carriage. When the voltage is too low a warning will be given. If the voltage is lower than the required minimum voltage, the unit will not operate.

The battery can be charged with any charger that can be used with a 12V car battery.

Note!

ALWAYS connect the charger to the + and - terminals on the side of the carriage and NEVER directly to the battery. The Sprimas electronics will be damaged if the charger is connected directly to the battery.

5.3 DROPLETS ON THE MEASURING PLATE

If the water from the sprayer makes too many droplets on the measuring plate then the plate must be cleaned with a grease removing substance, i.e. alcohol.

6 ERRORS

6.1 EMERGENCY STOP

Pressing the red button will stop the carriage immediately should problems occur.

6.2 THE GREEN LIGHT IS FLASHING

If the system registers an error or incorrect operation the green light will flash. The registered error and probable causes will be displayed on the screen when the carriage is connected to the PC.

6.3 NO ULTRA SOUND ECHO

Empty the measuring containers and rinse with clean water if the test liquid was contaminated (cleaning agents, herbicide, antifreeze). Fill the sprayer with clean water.

6.4 INACCURATE MEASUREMENTS

Probable causes; uneven liquid flow in the channels.

Solution:

- Remove grease, oil, wax and any build up of material in the channels and on the drip chains.
- The water should run along the drip chains into the measuring containers. Alter the position of the boom ensuring that the water is sprayed behind the drip chains.

7 REPAIRS

Repairs should only be carried out by trained personnel.

Note!

Moisture in the electronics housing can lead to incorrect operation of the system.

8 TECHNICAL DATA

Number of measuring channels:	10
Measurement range:	50 - 800 ml/min
Measuring container volume:	67 ml
Fill height measurement using ultra sound sensor:	Resolution +/- 0,07 mm
Maximum working width:	36 Meter
Travel sensor:	2500 pulses per revolution
Sensor wheel circumference:	Approx. 200 mm
Test time per m incl. Travel & wait time	
At 100 ml/min per channel:	15 - 20 seconds
At 400 ml/min per channel:	15 - 20 seconds
Return speed:	0,4 m/s
Battery capacity:	44 Ah
Consumption for 10 metres test:	< 0,5 Ah
Surrounding temperature	
Testing:	0°C - +30°C
Storage:	-10°C - +40°C
CE mark:	EMV/VDI recommendation 4500